Parallaxim nullam ſenſibilem, etſi pluries inten taverim, deprehendere potui; proindeque maxima ejus diſtantia à terra credenda eſt.

Hactenus Illuſtriſſimus Dominus *Franciſcus Bianchini* in Mathematicis Scientiis apprimè eruditus, & in obſervando, quoad noverim, accuratiſſimus. Ejus obſervatio à noſtra, mea ſcilicet, ac Prioris Dominici *Capaſſi* vix in uno aut altero minuto quoad latitudinem diſcrepavit, cæterùm omninò conformis. Quapropter nec illam hic arbitror apponendam.

IV. *Obſervations about* Waſps, *and the Difference of their Sexes. By the Reverend Mr.* Derham, *F. R. S. Prebendary of* Windſor.

IN the Beginning of *July* laſt 1723. having frequent occaſion to be on the Top of our *Collegiate Chapel* in *Windſor Caſtle*, I obſerved many *Waſps* flying about it, and particularly frequenting a Covering of Deal Boards, and the Pieces of Timber lying on the Leads. I took notice that moſt of theſe *Waſps* were of a larger ſort than uſual, and thought they came thither to gnaw the Wood, and to carry it away in Mouthfuls to build their Neſts; the Artifice of which I have taken notice of in my *Phyſ. Theol.* particularly *B.* 4. *ch.* 11. *note* 21. and *chap.* 13. *not.* 12. But having caught ſome of them, and amongſt the reſt a large *Queen-Waſp* (which ſort of Waſp, by the by, never engages in any Labours of the Colony) I began to be more ſtrict in my Obſervations, and on *July* 6. I obſerved a Cluſter of only three *Waſps* cloſely embracing each other; one of which was a large *Female*

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male Waſp, the other two of a leſſer ſort. This more excited my Curioſity. And ſoon after, I found 8 or 10 *Waſps* cloſely hanging together, and divers other ſuch like Parcels. In the midſt of all which was conſtantly a *Queen-Waſp*, and only one; the reſt being always of a different Sort from either the Queen or the common Waſps; which gave me a Suſpicion of their being *Male* and *Female*. And therefore examining another Company of them with greater Strictneſs, I found the *Queen-Waſp*, *in coitu*, with one of the other Waſps, ſo cloſely joined Tail to Tail, that it was ſome Time before they were parted.

After this I caught all the Waſps I could, on the top of our Chapel, but could not ſee one of the *common labouring Waſps* among them; but all were for the moſt part *Male Waſps*, with now and then a *Queen*, or *Female*, among them, and ſhe generally *in coitu*.

And now from this Hiſtory of my Obſervation, it appears, That there are three ſorts of *Waſps*; The *Queens*, or *Females*; the *Kings*, or *Males*; and the *common Labouring-Waſps*; each of them very diſtinct.

The *Queen*, or *Female-Waſp* (by many called the *King-Waſp*) is much longer in the Body, and larger than any other Waſp.

The *Male Waſps* are leſſer than the *Queens*, but as much longer and larger than the *common Waſps*, as the *Queen* is longer and larger than theſe. Theſe *Males* alſo have no Stings, which the *Queens* and *common Waſps* all have. And theſe are thoſe which *Mouſet* ſaith Authors call Ἀκέντρους, and take to be *Females*, although he is of another Opinion, imagining all Waſps to have Stings; upon his examining a Waſp's

Neſt

Neſt, at *Ham*, *Anno* 1587. in which he found no Waſps without a Sting. But I wonder how that curious Enquirer miſſed of theſe ſting-leſs Male *Waſps*. Surely he was too haſty in his Examination, and not being aware of the difference, he thought the *Males* (which are but few in number to the *labouring Waſps*) were the ſame and had Stings as well as the reſt; or elſe he made his Enquiry at a Time when perhaps the Males had deſerted the Neſt, which probably they may do, as the *Male* or *Drone-Bees* are forced to do: or elſe the Year 1587. (in which *Mouſet* made his Obſervation) might produce fewer *Waſps*, at leaſt fewer *Male Waſps*, than this laſt Summer of 1723. did, in which I made my Obſervation; which was obſerved to have a greater abundance of Waſp-Neſts than hath been known in many Years. And in all the Neſts that I ſearched into, I conſtantly found *Male Waſps*, either many or few, according to the Size of the Neſt, and Number of Waſps therein. And the Part of the Neſt where theſe Males are bred, or at leaſt where I found them moſt to reſide, was chiefly the two uppermoſt Cells, or Partings, between the Combs, but one.

But to return to the Diſtinction of our *Male Waſps*. Another thing by which they may be known from other Waſps, is their *Antennæ*, or *Horns*; which are longer and larger than either thoſe of the *Queen*, or *common Waſps*; and with them they ſeem, in running, to feel more than the others do.

But the grand and chief Difference, are the *Parts of Generation* of theſe *Male Waſps*, quite different from other Waſps. Which I diſſected with all Care, and ſhall give a Deſcription of, as well as I can, without Figures, which I could not get drawn, partly for want of a Deſigner, and partly from my Removals between *Windſor* and *Upminſter*: in which Time the

Parts are ſo dried up, or eaten with Mites, that they cannot be drawn 'till the Return of Waſp time.

For the Diſcovery of theſe Parts, if the *Alvus* be preſſed, an *Horny* or *Shell-like Part* will be thruſt out, of a ſhining black Colour, which conſiſts of two Parts like Shells, ſomewhat reſembling the *Caſtagnets* uſed in Dancing; at the extreme Part of each of which grows an *Hook*, ſomewhat like thoſe of the Earwig's Tail, but much leſſer; in the Middle, between theſe Hooks, appear three Parts, the middlemoſt of which is a ſtiff brown *Tube*, very curiouſly made, with the Fore-part like a Spoon or Ladle, and the other End (within the Body) is neatly branched and braced to each Side within the two Shells I ſpake of. A little above which Branching, is a φυσκον or *Swelling*, like that of a Dog's Pizzle, and perhaps ſerves for the ſame Uſe, if this Tube is (as I imagine it is) the *Penis* of the Waſp.

On each Side this *Penis*, lies a ſtiff Part (in Number two) branched at the Top with ſomewhat like Hairs, giving them the Reſemblance of *Bruſhes*. At the Bottom of which are two curious black *Cells*, with an *Opening* on one Side like that of the *Concha Veneris*, with ſmall whitiſh Hairs growing on one Edge thereof. What the Uſe of theſe two Bruſh-like Members may be, I know not, unleſs it be to ſtrengthen and ſupport, or direct the *Penis in coitu*, or provoke therein.

Behind all theſe Parts, which I have deſcribed, more within the Body lies a long contorted white *Veſſel*; which at firſt I took to be the real *Penis*, penetrating the *Ladle-like Tube* I ſpake of. But upon farther Examination, I rather take it to be the *Spermatick Veſſel*.

As to the Uſe of the two little *Hooks* I mention'd at the End of the *Uropygium*, or *Shells*, I take them

to be, to catch hold of the *Female*'s *Podex*, and to direct and aſſiſt the Penetration of the *Penis in coitu*.

As for the *Parts of Generation* in the *Queen*, or *Female-Waſps*, nothing was to be ſeen ſo remarkable as in the *Male*; but thoſe Parts are very like what we ſee in the *common Labouring-Waſps*: Indeed, with the moſt accurate Obſervations I could make with my Microſcopes, I could not perceive any Difference at all. For which Reaſon I ſuppoſe it is that moſt of the Writers upon *Waſps* and *Bees*, have been very confuſed and wavering about the Sexes of theſe two Tribes of Inſects. It would be endleſs to cite the Authors and their Opinions, eſpecially concerning the *Bee-Tribe*. I think *Swammerdam* (*a*) (who as he was one of the firſt that rejected Equivocal Generation, ſo was one of the moſt judicious Writers of Inſects) that his Opinion, I ſay, is the moſt juſt, *viz.* That of *Bees*, there are three Sorts, *viz.* 1. Rex, *aut verius* Regina, *ſiquidem ſequioris ſexûs eſt.* 2. Fuci, *qui Maſculi proprie ſunt.* 3. Apes Operariæ, *quarum Sexum diſtinguere non poſſumus, cùm in iis nec Maſculas nec Fœminas partes obſervemus: quæ perbellè diſtinguntur in* Fucis *ſeu* Regibus, *&* Reginis, *quæ tralatitio errore* Reges *ſolent ſalutari. In* Reginis *certè invenimus* Ovarium *apud incomparabilem illum Anatomum* Joh. van Horne, *&c.*

As for what is related by *Ariſtotle*, *Pliny*, *Virgil*, or any other ancient Authors, or by our more numerous Moderns, concerning the Production of *Waſps* out of *Horſes*, or *Bees* out of *Oxen* or *young Bullocks*; as alſo of their *Polity*, their *Emperours*, *Kings*, *Dukes*, and *common Subjects*, their exact *diſcipline and Juſtice*,

(*a*) Swam. Hiſt. Inſect. *p.* 92.

their ſtrict *Temperance*, and other *Virtues*, with a great deal more of ſuch like Stuff: This is ſo very whimſical, that it is not worth while to take any farther Notice of it: But there is a Story ſeriouſly told by *Mouſet*, (*b*) that deſerves our Obſervation, *viz.* That *in the Year* 1582, *being on the higheſt Ridges of the* Cartmel-Hills, (I ſuppoſe in *Lancaſhire*) *he ſaw among the Rocks two Species of Waſps deſperately fighting: That they differed only in Magnitude; that the larger truſted to their Strength; and the leſſer to their Numbers, there being ſix of the leſſer engaged againſt only one of the larger ſize, and that the Battle was not in the Air, but among the Graſs, and laſted for ſome Hours in the hoteſt Sun, not being at an end in two or three Hours ſpace.* The Cauſe of this Engagement *Mouſet* thinks was, that the *great Waſps* are wont to rob the *leſſer* of their Honey and Young, or do them ſome other ſuch like Miſchief; and the *leſſer* being very revengeful, and naturally full of Courage, did outbrave even *Mars* himſelf in aſſaulting their Enemy. But this Engagement I take to be ſuch another, as that which I have given the Hiſtory of, namely one under the Conduct of *Venus*, not of *Mars*.

And as there is no Doubt to be made of its being ſuch, and that the Engagement ſeen by *Mouſet* was on the higheſt Tops of *Cartmel* (*in ſummis Cartmeli montium jugis*) as that I ſaw was on the very Top of our *Chapel*, it may deſerve Obſervation, whether the *Waſps* ever copulate in lower Places, obvious to Diſturbance, and every one's Eye, or only on ſuch Eminencies where they can be more out of Sight, and conſequently in greater Safety: And if at any time they ſhould be found in Copulation, they may all

(*b*) Mouſet Theat. Inſect. *l.* 1. *c.* 8.

all with Safety be ſeized with the naked Hand, provided it can be ſecured againſt the *Queen-Waſp*, which is the only one in the Company that is provided with a *Sting*.

For a Cloſe of theſe Obſervations about the Sexes of Waſps, I ſhall take Notice of *Mouſet*'s Experiment, (which I try'd) *viz. If you take a Waſp by the Feet, and ſuffer her to buz, that thoſe Waſps, which have no Stings, will fly to her, but not any that have Stings. Which ſome*, he ſaith, *uſe as an Argument to prove that ſome Waſps are Males, ſome Females.* This Experiment I was minded to try with a *Queen-Waſp*, more eſpecially, not knowing but that *Waſps*, particularly the *Males*, might be as fond of their *Queens*, as the *Bees* are of theirs, who will not forſake them, but will live and die with them. But I did not find it to ſucceed ſo among the *Waſps*. For although I put ſome *Queen-Waſps*, and others alſo, near the Entrance of ſome large *Waſp-Neſts*, yet I did not ſee any Flock near them, only now and then one of the common Waſps, for a little while, to ſee their Fellow confined. But indeed the *Queen-Waſps* which I confined were weak, and did not buz long; as alſo the time of Copulation was probably paſt, it being *Auguſt* 12. when I try'd the Experiment.